# Deep learning using the human brain

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# Outline

Crisis in education?

Causes for the crisis

Reformation principles

# Outline

# The information/communication revolution presents both opportunities and challenges

exponential increase of information

knowledge becomes quickly outdated

various distractions are just "one click away"

# The information/communication revolution impacts the need and the way we study

"Google knowing"        (what does know mean?)

AI makes us redundant        (Yuval Noah Harari)

impacts of social media on "deep work"

# Students' viewpoint: teaching is boring!

students find teaching boring

they disengage, drop out, and

have mental health problems

# Employers' viewpoint: lack of qualifications

inflation of diplomas

irrelevant of what is taught

lack of creative independent thinking people

# Outline

# Lecturing is not an effective method for achieving students' understanding

*"Lecture is copying the lecture notes of the professor's to the student's notebooks without passing the brain of either the professor or the students."*        *Eric Mazur*

information is readily available,
however, understanding is difficult

practical sessions are focused on drill exercises
projects have predefined steps to follow

exams test rote knowledge

# Schools and universities operate according to a "factory model"

"packaging" information into courses

fixed curricula, little change in study programs

individual approach to the students is missing

# The educational system has inertia

not everyone sees need for change

diverging views what/how to change

teachers are product of the system
they teach the same way they were taught

# Outline

# Why we need education?

- ▶ because we are curious to learn
- ▶ want to follow creative pursuits and
- ▶ want to connect with like-minded people

# What we need to study?

- ▶ the meta skill of "learning to learn"
- ▶ less is more: identify (the few) important ideas

# How we learn (understand)?

- ▶ no shortcut: the only way to understand is to discover
- ▶ discussions, problem solving, and project work

# The right motivation is curiosity
## (not grades, degrees, and awards)

encourage curiosity and creativity
give students choice and freedom to explore

show students the pleasure of discovery

learning is lifelong process

# Value and develop critical thinking

take nothing for granted,
assess new information critically

compare approaches, beware of their limitations

develop skills to further advance knowledge

# The real value of schools/universities is meeting with like-minded people

we need a learning environment
(others who value what we do)

learning through discussions (peer instruction)

develop presentation and debating skills

# The "less is more" principle

understanding deeper a few things is better
than knowing superficially many things

there is much information but few key ideas

teach students how to learn on their own

*"Give a man a fish, he eats for a day;
teach a man to fish, he eats for a lifetime."*

# A problem well defined is a problem half solved

problem formulation is underrated skill

pose open-ended, loosely defined problems

let students choose the projects they work on, breaking them into sequence of subproblems

# Instill a spirit that everything is related

combining knowledge from various fields

explore different ideas, approaches, methods

find connections, compare and contrast ideas

# Learning through problem solving

*"I hear, I forget;*
*I see, I remember;*
*I do, I understand."*

the goal is understanding, not mere knowing

the only way to understand is self-discovery

understanding is manifested by problem solving

# Teaching and learning methods

flipped classroom

peer instruction

Moore method

# Project-based learning

gain practical experience

encourage team work

develop entrepreneurial spirit

# Personalized education

assign personal projects

have regular personal feedback

let students be responsible for their education

# "Soft" skills

oral presentation / debating

project writing

teamwork

# Conclusions

knowing $\neq$ understanding

we need understanding and creativity

our only chance to not become redundant